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# WATER SUPPLY OUTLOOK FOR MONTANA

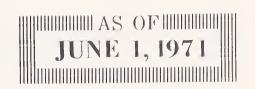
Prepared by

# U. S. DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Collaborating with

MONTANA AGRICULTURAL EXPERIMENT STATION

Data included in this report were obtained by the agencies named above in cooperation with Federal, State, and private organizations listed on the inside back cover of this report.



### TO RECIPIENTS OF WATER SUPPLY OUTLOOK REPORTS:

Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season will interact with a resultant average effect on runoff. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1900 snow courses in Western United States and in the Columbis Basin in British Columbia. Networks of automatic snow water equivalent and related data sensing devices, along with radio telemetry are expanding and will provide a continuous record of snow water and other parameters of key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data on reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

### PUBLISHED BY SOIL CONSERVATION SERVICE

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies of the reports for Western United States and all state reports may be obtained from Soil Conservation Service, Western Regional Technical Service Center, Room 209, 701 N. W. Glisan, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS
Alaska	P. O. Box "F", Palmer, Alaska 99645
Arizona	6029 Federal Building, Phoenix, Arizona 85025
Colorado (N. Mex.)	12417 Federal Building, Denver, Colorado 80202
Idaho	Room 345, 304 N. 8th. St., Boise, Idaho 83702
Montana	P. O. Box 970, Bozeman, Montana 59715
Nevada	P. O. Box 4850, Reno Nevada 89505
Oregon	1218 S. W. Washington St., Portland, Oregon 97205
Utah	4012 Federal Bldg., 125 South State St., Salt Lake City, Utah 84111
Washington	360 U.S. Court House, Spokane, Washington 99201
Wyoming	P. O. Box 2440, Casper, Wyoming 82601

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CONSERVATION OF WA

### PUBLISHED BY OTHER AGENCIES

Water Supply Outlook reports prepared by other agencies include a report for California by the Water Supply Forecast and Snow Surveys Unit, California Department of Water Resources, P. O. Box 388, Sacramento, California 95802 --- and for British Columbia by the Department of Lands, Forests and Water Resources, Water Resources Service, Parliament Building, Victoria, British Columbia

# WATER SUPPLY OUTLOOK FOR MONTANA

and FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

Issued by

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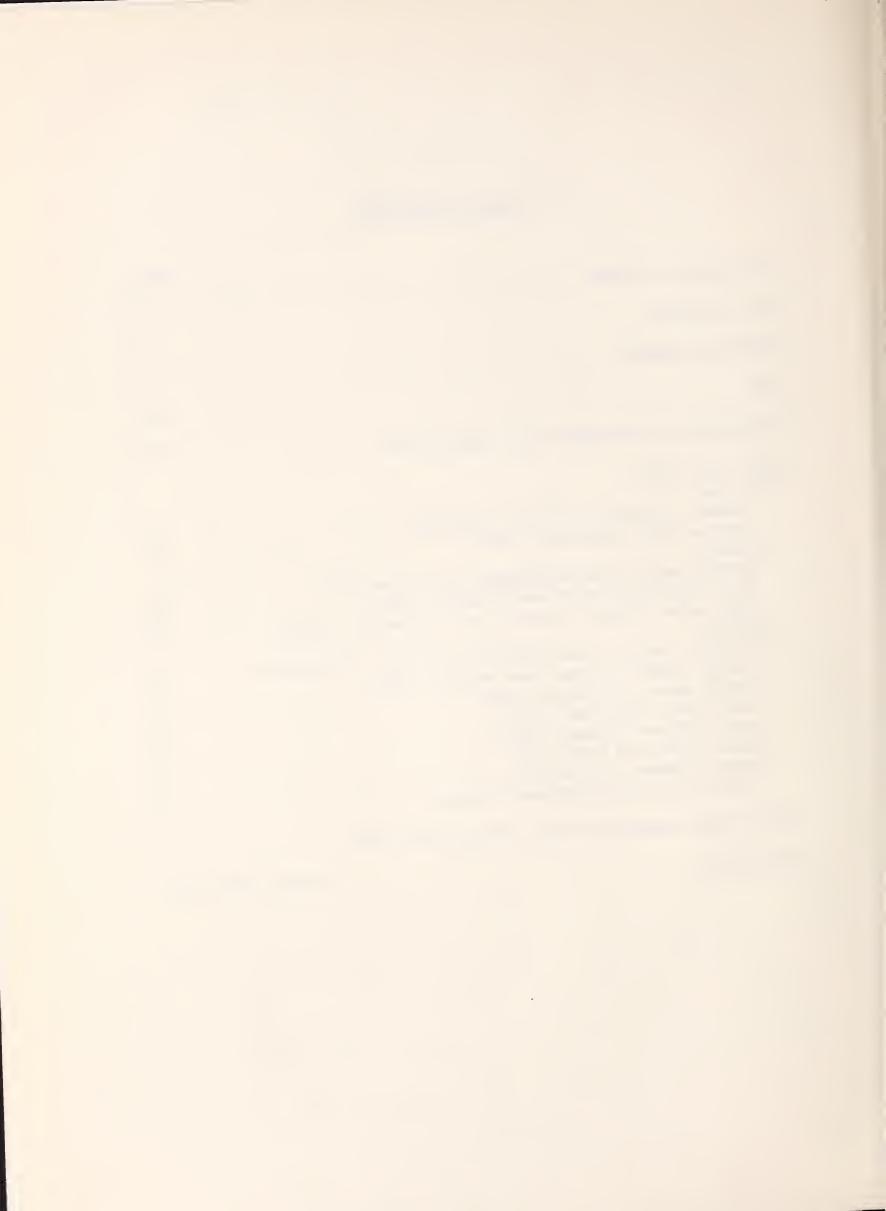
GEORGE P. CLAGETT, Assistant Snow Survey Supervisor

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# TABLE OF CONTENTS

Pa WATER SUPPLY OUTLOOK	age 1
SOIL MOISTURE	2
RESERVOIR STORAGE	3
SNOW	<b>4-</b> 6
SUPPLEMENTAL MEASUREMENTS AND CORRECTIONS	7-9
SNOW FILLOW DATA Kootenai	
Poorman Creek and Banfield Mountain	10
Hawkins Lake and Garver Creek	11
Columbia	
Hoodoo Basin, Peterson Meadows and Black Pine	12
North Fork Elk Creek and Lubrecht Flume	13
Twin Lakes, Saddle Mountain and Twelvemile Creek	14
Missouri	
Madison Plateau, Lion Mountain and West Yellowstone .	15
Bridger Bowl, Bangtail and Maynard Creek	16
Carrot Basin and Taylor Peaks	17
Lick Creek and Shower Falls	18
Spur Fark and Deadman Creek	19
Rocker Peak and Rocky Boy	20
Mount Lockhart and Waldron	21
Fisher Creek and Northeast Entrance	22
MAP OF SNOW COURSES AND SOIL MOISTURE STATIONS	
COOPERAIORS Inside Back Cov	/er

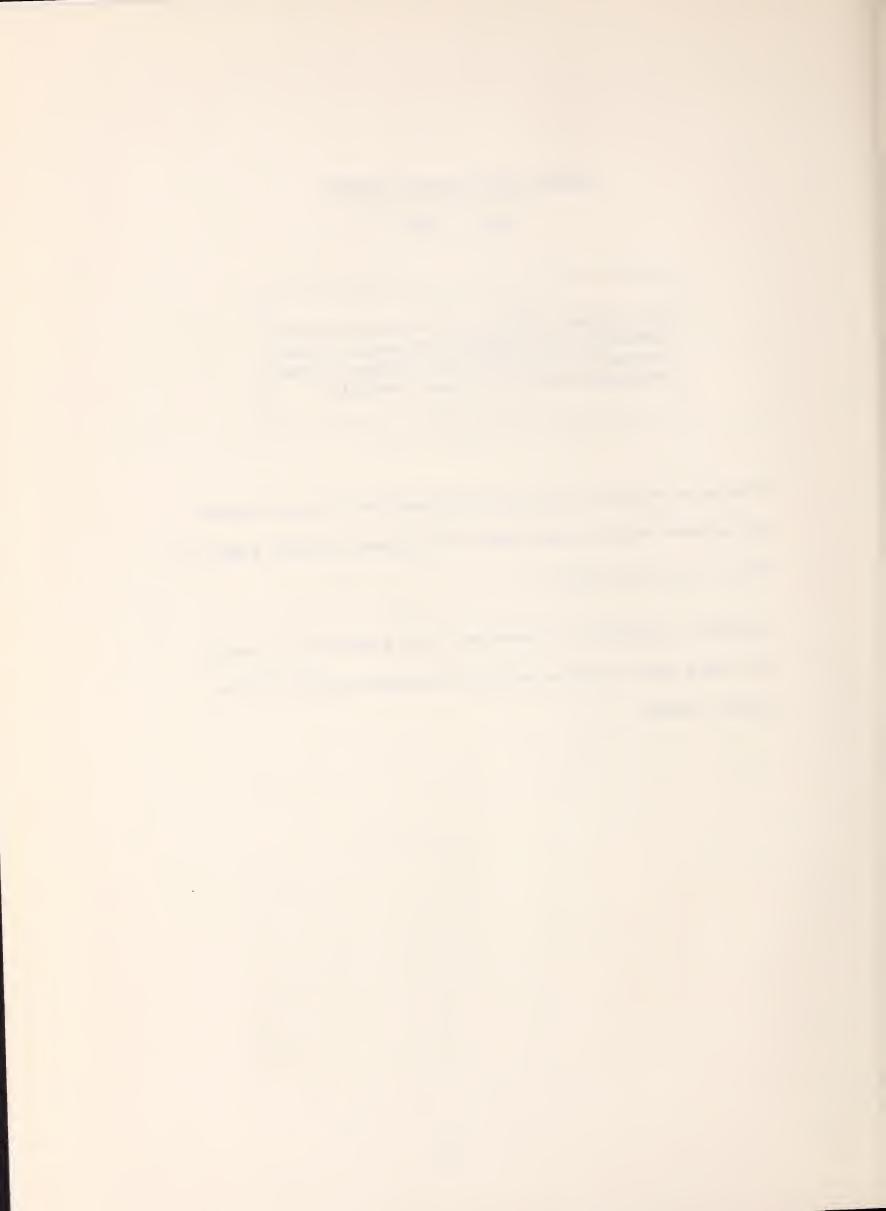


### MONTANA WATER SUPPLY OUTLOOK

June 1, 1971

Alternate periods of cool and warm weather have kept nearly all streams within their banks and delayed snowmelt peaks on major rivers into June.

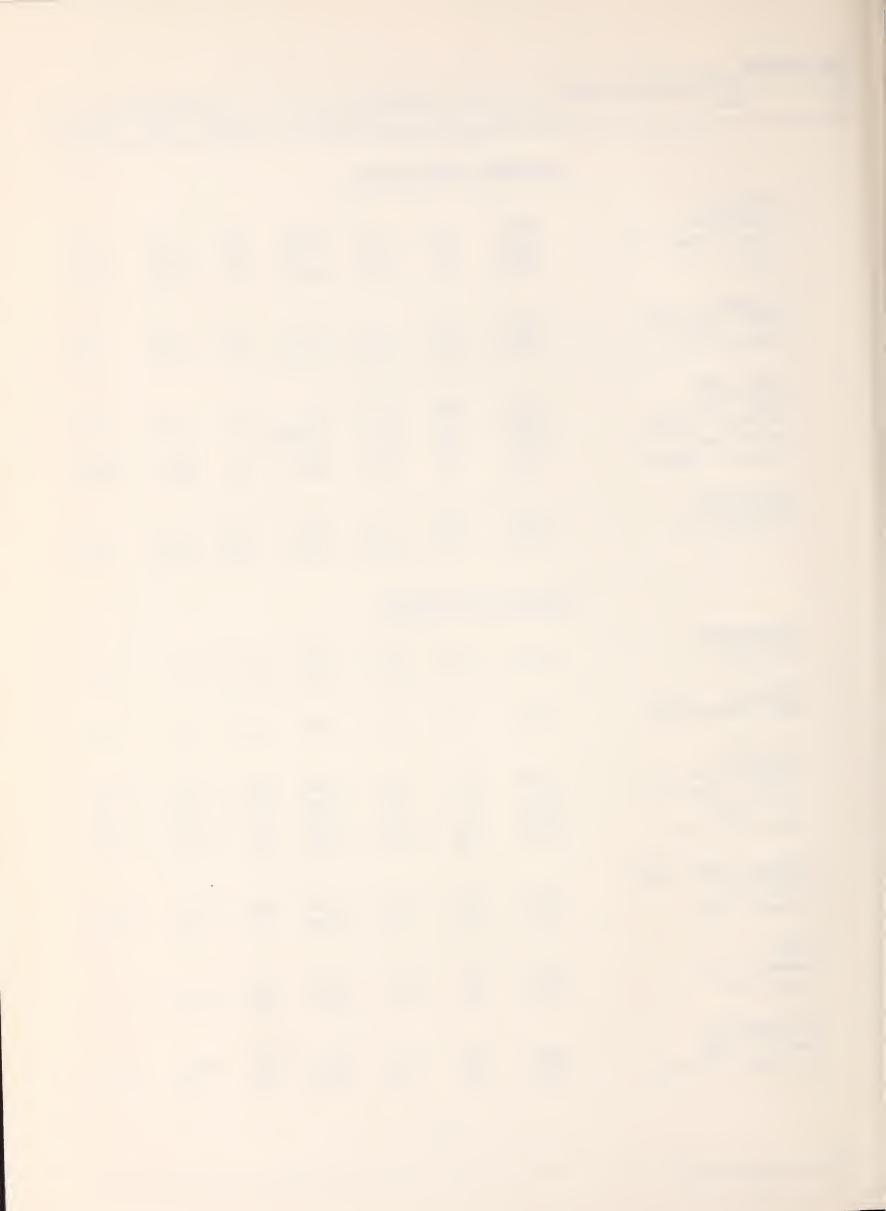
Irrigation supplies are expected to be excellent in nearly all areas and streamflow should be adequate well into the summer period.



SOIL MOISTURE

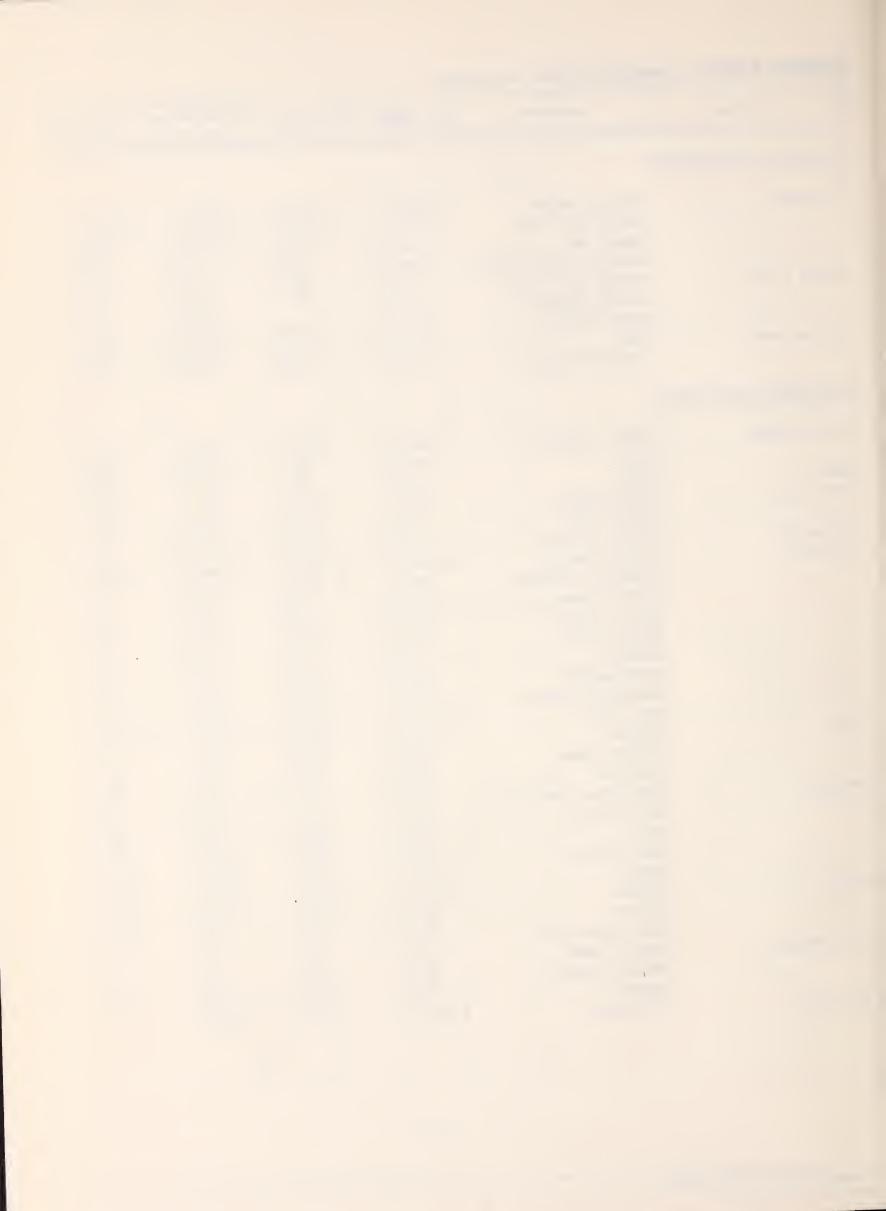
DRAINAGE BASIN and/or STATION	DRAINAGE BASIN and/or STATION Profile (Inches)		Date of	Soil Moisture (Inches)			
Name	Elevation	Depth	Capacity	Survey	This Year	Last Year	Average +
	COLUMBIA	RIVER	BASTN				
	COHOIIDIZI	KIVLK	DITOTIV				
Kootenai							
Baree Trail	3800	48	7.5	6/01	6.5	5.3	6.1
Murphy Lake R. S.	3000	48	22.6	6/02	21.9	20.0	20.9
Raven R. S.	3050	48	23.0	6/01	15.0	18.8	18.9
Flathead							
Desert Mountain	5600	54	8.4	6/02	8.7	8.9	8.9
Marias Pass	5250	54	6.5	5/28	7.3	6.5	6.0
Clark Fork							
Black Pine	7100	48	10.0	6/04	8.0	8 . 8	8.6
Lubrecht Forest	4100	48	26.8	Delaye	ed	æ	.mo
Seeley Lake R. S.	4030	48	11.9	6/02	11.2	11.6	11.0
Skalkaho Summit	7260	48	10.8	6/04	9.9	10.1	10.0
Bitterroot							
Gibbons Pass	7100	48	7.1	5/28	7.3	7.4	7.1
Lolo Pass	5250	48	10.6	5/26	9.9	9.9	9.9
	MISSOURI	RIVER	BASIN				
Beaverhead							
Lakeview	6700	48	15.3	6/02	17.3	16.7	14.9
Madisən							
West Yellowstone	6700	48	6.5	5/28	3.2	3.7	3.2
Gallatin							
Bridger Bowl	7250	48	17.0	6/03	16.5	16.6	16.4
College Site No. 2	4856	54	17.7	5/28	15.5	18.0	9.5
Lick Creek	6860	48	18.8	5/26	17.4	19.3	18.2
Twenty-One Mile	7150	48	10.0	5/28	10.1	10.1	9.9
Missouri Main Stem							
Kings Hill	7420	48	11.8	5/28	10.8	10.9	10.9
Stemple Pass	6350	48	5.9	5/28	5.4	5.5	5.2
Milk							
Beaver Creek	3950	48	20.9	5/28	13.3		=
Rocky Boy	4700	36	10.1	5/28	9.4	9.7	=
Yellowstone							
Battle Ridge	6020	48	17.6	6/03	16.9	15.3	15.7
Northeast Entrance	7350	48	9.4	6/02	8.8	9.8	9.2

<sup>&</sup>lt;u>~2~</u>



# RESERVOIR STORAGE (Thousand Acre Feet) END OF MONTH

	250501010	Usable		Usable Storage	
Basin or Stream	RESERVOIR	Capacity	This Year	Last Year	Average
COLUMBIA RIVER BA	STN				
COLORDIA RIVER DA	JIN COLIN				
Flathead	Hungry Horse	3,428.0	2,618.0	2,428.0	2,632.0
	Flathead Lake	1,791.0	1,526.0	1,411.0	1,494.0
	Camas (4)	45.2	37.0	29.9	
	Mission Valley (8)	100.3	80.6	76.5	63.1
Clark Fork	Georgetown Lake	31.0	27.1	27.8	
	Nevada Creek	12.6		12.6	11.8
	Noxon Rapids	334.6	310,2	290.9	220.7
Bitterroot	Como	34.9	35.4	22.6	28.1
	Painted Rocks	31.7	32.5	33.4	32.6
MISSOURI RIVER BA	SIN				
Beaverhead	Clark Canyon	328.9	165.7	167.3	127.7
Dea verifica a	Lima	84.0	79.4	81,6	50.9
Ruby	Ruby	38.8	36.0	38.8	37.3
Madison	Hebgen Lake	377.5	295.4	331.6	278.4
112213011	Ennis Lake	41.0	36.5	39.5	35.7
Gallatin	Middle Creek	8.0	5.0	5.3	
Missouri	Canyon Ferry	2,043.0	1,351.0		
III 550 d I I	Hauser & Helena	61.9	60.1	59.0	57.3
	Lake Helena	10.4	9.8	9.4	8.9
	Holter Lake	81.9	77.3		
	Smith River	10.7	11.5	11.5	
	Durand	7.0	7.0	7.0	6.4
	Martinsdale	23.1	18.4		
	Deadman's Basin	72.2	60.0		
	Fort Peck		17,180.0		
Sun	Gibson	105.0			
ban	Willow Creek	32.3			
	Pishkun	32.0	31.2		
Marias	Lower Two Medicine	16.6	31.2	12,4	
TIAT LAS	Four Horns	19.2	14.0		
	Swift	30.0			
	Lake Frances	112.0			
	Tiber	1,347.0			
Milk	Fresno	1,347.0	102.1		
TILL	Nelson	66.8			
	Lake Sherburne		45.0		
Yellowstone	Mystic Lake	20.8			
ICTIOMSCOILG	Tongue River	68.0			
	Cooney	27.5			
Big Horn	Yellowtail	1,356.0			10.5
DIE HOLH	TETTOWLATT	1,550.0	/31.0	フラブ・サ	-



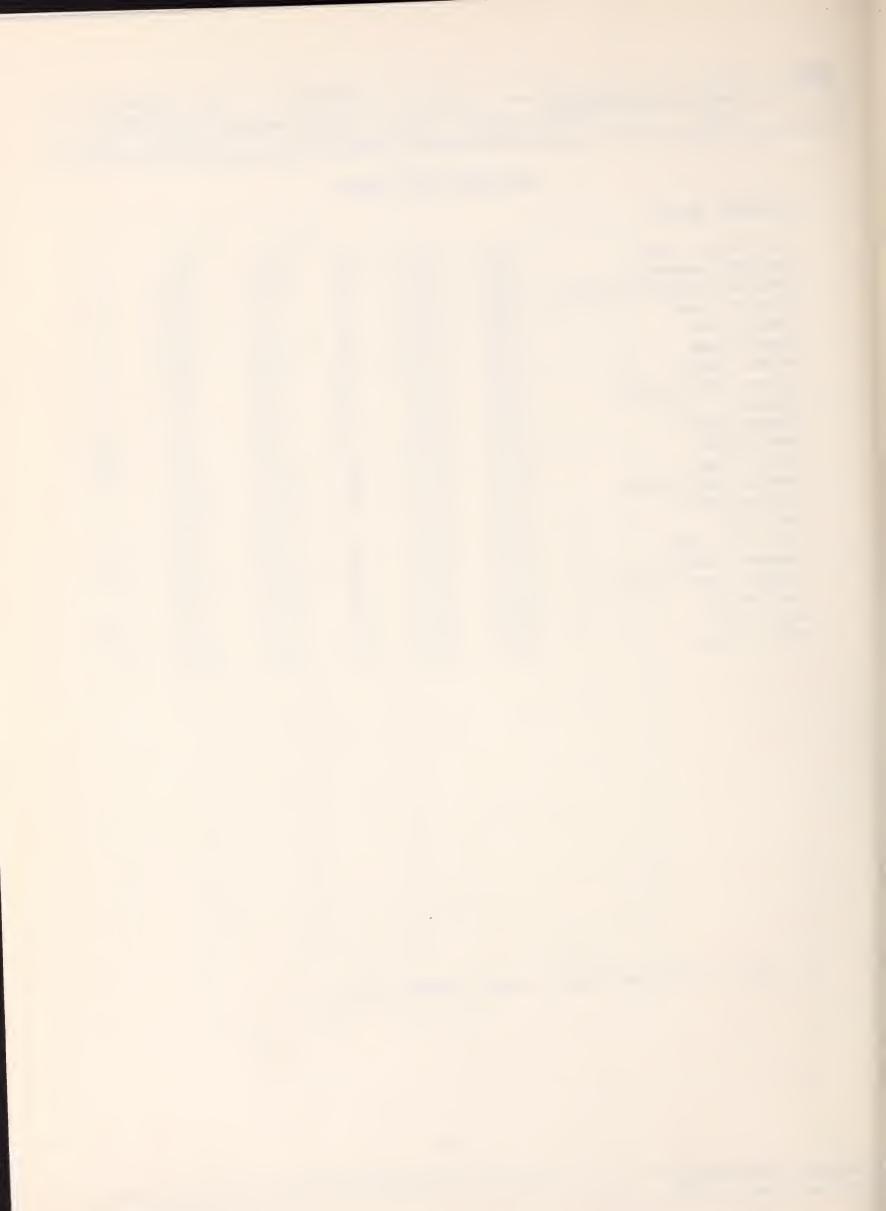
SNOW			THIS YEAR		PAST R	ECORD
DRAINAGE BASIN and/or SNOW COURSE		Date	Snow Depth	Water Content	Water Conte	ent (inches)
NAME	Elevation	of Survey	(Inches)	(Inches)	Last Year	Average

# COLUMBIA RIVER BASIN

# KOOTENAI RIVER

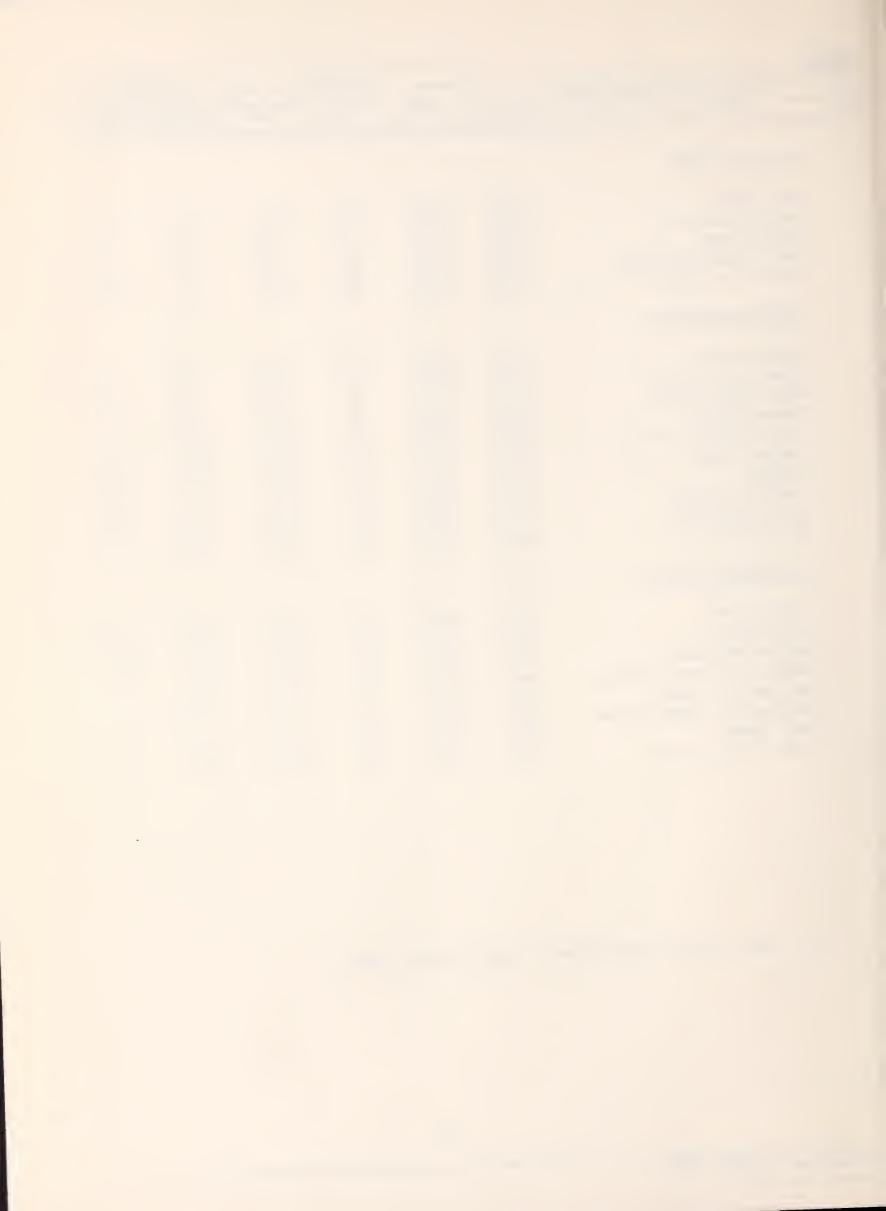
Bald Eagle Peak	5700	5/25	118	64.9	45.1	<u></u>
Banfield Mountain	5600	5/27	16	8.5	7.4	·
Banfield Mountain Pillow	5600	5/27	. SP	7.9	0.9	ac)
		•				
Bristow Creek	3900	5/27	0	0.0	0.0	œ
Cedar Grove	4100	5/25	0	0.0	0.0	esso.
Davis Creek	5400	5/26	18	9.8	0.0	=
Garver Creek	4250	5/26	0	0.0	0.0	œ
Garver Creek Pillow	4250	5/26	SP	0.0	0.0	œ
Glacier	4100	5/28	27	13.4	11.1	11.2
Graves Creek	4300	5/28	9	4.2	0.0	0.8
Gray Creek	5100	5/30	29	9.6	0.0	11.3
Hawkins Lake	6450	5/26	68	34.3	17.0	cm
Hawkins Lake Pillow	6450	5/26	SP	39.8	14.0	300
Kicking Horse	5400	5/31	2	0.7	0.0	aro
Lost Soul	4800	5/27	0	0.0	0.0	œ
Morrissey Ridge	6100	6/01	15	8.5	0.0	13.0
Poorman Creek	5100	5/25	32	17.5	12.9	эю
Poorman Creek Pillow	5100	5/25	SP	20.8	4.7	=
Red Mountain	6000	5/28	18	9.2	5.2	5.6
Stahl Peak	6050	5/28	66	43.0	26.9	œ
Weasel Divide	5450	5/28	56	29.5	14.4	19.7

SP - Snow pillow observation - water content only.



1		THIS YEAR			PAST RECORD		
DRAINAGE BASIN and/or SNOW COURSE		Date			Water Content (inches)		
NAME	Elevation	of Survey	(Inches)	(Inches)	Last Year	Average	
FLATHEAD RIVER							
Big Creek	6750	6/02	88	46.6	47.4	42.7	
Desert Mountain	5600	6/02	0	0.0	0.0	0.7	
Fatty Creek	5500	6/02	13	6.5	12.8	7 0 4	
Hell Roaring Divide	5770	6/02	15	8.1	œ	13.5	
North Fork Jocko	6330	6/03	55	31.4	34.2	30.7	
CLARK FORK RIVER							
Black Pine	7100	6/04	0	0.0	0.0	4.]	
Black Pine Pillow	7100	6/04	SP	0.0	3.7	5.0	
Heart Lake Trail	4800	6/02	4	2.0	3.0	360	
Hoodoo Basin	6000	6/02	84	42.3	37.8	32 . 9	
Hoodoo Basin Pillow	6000	5/28	SP	51.2	32.1	- mo	
Hoodoo Creek	5900	6/02	85	42.4	36.5	32.0	
Lookout	5250	6/02	. 35	18.2	20.7	13.9	
Skalkaho Summit	7260	6/04	33	16.2	16.4	16.8	
Stuart Mountain	7400	5/28	51	27.0	26.0	18.0	
TV Mountain	6800	5/28	25	11.8	13.8	Œ	
BITTERROOT RIVER							
Gibbons Pass	7100	5/28	31	15.8	14.9	7.6	
Lost Horse	5940	5/27	63	31.6	26.8	18.5	
Saddle Mountain	7940	5/28	55	26.8	24.5	18.	
Saddle Mountain Pillow	7940	5/28	SP	31.8	25.4	85	
Twelvemile Creek	5600	5/27	0	0.0	0.0	∞	
Twelvemile Creek Pillow	5600	5/27	SP	0.0	0.0	œ	
Twin Lakes	6510	5/27	85	43.3	36.6	32.2	
Twin Lakes Pillow	6510	5/27	SP	44.1	33.1	ne.	

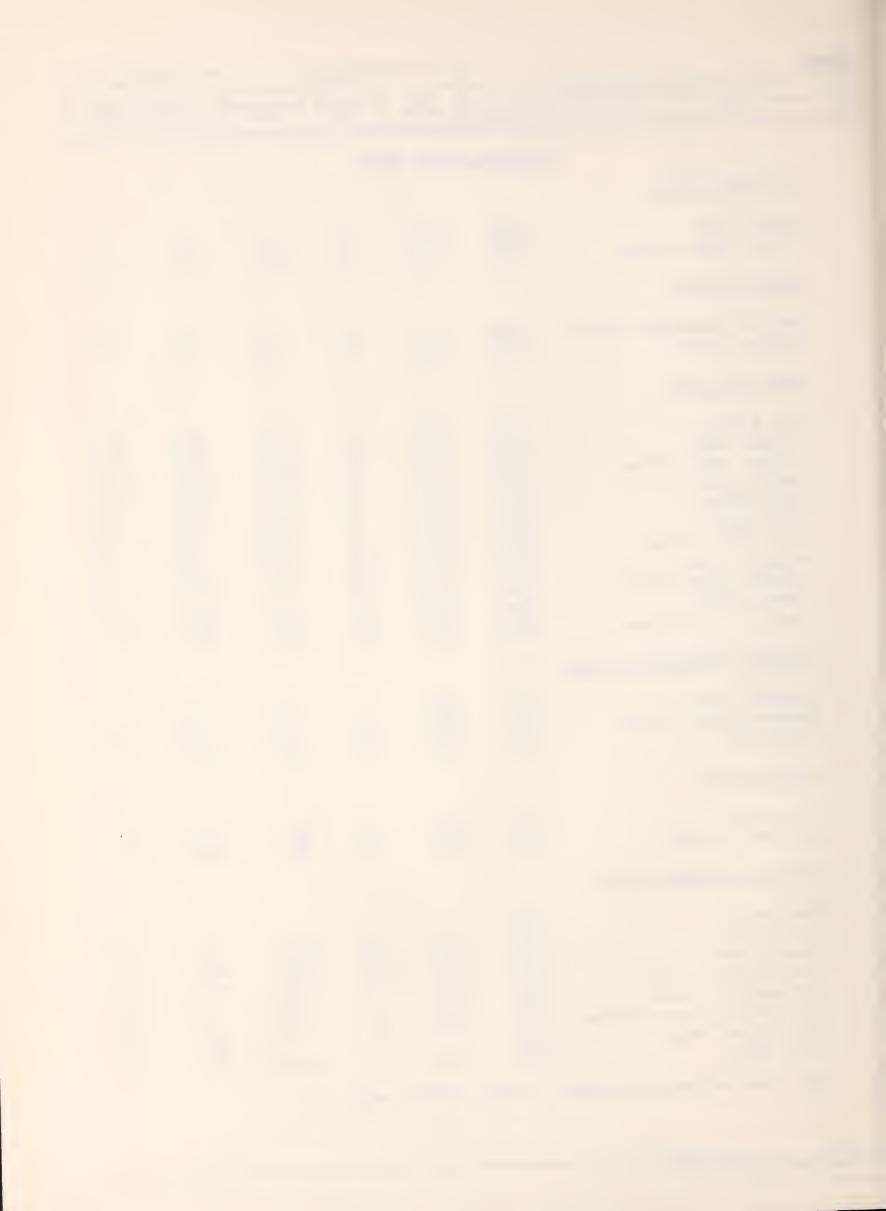
SF - Snow pillow observation - water content only.



SNOW			THIS YEAR		PAST R	ECORD
DRAINAGE BASIN and/or SNOW COURSE		Date	Snow Depth	Water Content	Water Conte	ent (inches)
NAME	Elevation	of Survey	(Inches)	(Inches)	Last Year	Average

<u>M</u>	ISSOURI	RIVER BA	SIN			
JEFFERSON RIVER						
Rocker Peak Rocker Peak Pillow	8000 8000	6/02 6/02	27 SP	11.7 18.6	12.9 17.6	500 400
MADISON RIVER						
West Yellowstone Pillow Whiskey Creek	6700 6800	5/28 6/01	SP 0	0.0	0.0	0.0
GALLATIN RIVER						
Arch Falls Bridger Bowl Bridger Bowl Pillow Devils Slide Hood Meadow Lick Creek Lick Creek Pillow Maynard Creek Maynard Creek Fillow Shower Falls Shower Falls Pillow	7350 7250 7250 8100 6600 6860 6210 6210 8100	6/01 6/03 6/01 6/01 5/26 5/26 6/03 6/03 6/01	33 71 SP 70 2 0 SP 13 SP 77	14.4 35.8 35.6 31.6 0.7 0.0 0.0 6.9 5.2 37.5 33.9	16.8 34.4 32.8 34.4 10.0 4.9 1.8 13.5 10.1 39.3 38.4	15.3 23.0 2.4 0.0 0.0 5.6 4.8 25.6
MISSOURI RIVER (Main Stem)						
Deadman Creek Deadman Creek Pillow Kings Hill	6450 6450 7500	6/03 6/03 6/03	0 SP 23	0.0 0.0 10.7	0.0 0.0 18.6	0.0 0.0 10.3
JUDITH RIVER						
Spur Park Spur Park Pillow	8000 8000	6/03 6/03	42 SP	21.7 20.7	26.8 26.8	19.5 18.5
UPPER YELLOWSTONE RIVER						
Camp Senia Cooke Station Fisher Creek Fisher Creek Pillow Northeast Entrance Northeast Entrance Pillow Timberline Creek White Mill	7890 8150 9100 9100 7400 7350 8850 8700	6/02 6/02 6/02 6/02 6/02	38 104 SP 0 SP	20.0 58.9 53.8 0.0 0.0	9.1 17.3 40.2 37.3 1.2 0.1 21.1 28.7	33.5 .30.6 0.4 0.0

SP - Snow pillow observation - water content only.



## SUPPLEMENTAL MEASUREMENTS

	JANUARY	1,	1971
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Avalanche Bear Paw Ski Area Deadman Creek Lake Creek Lion Mountain Meridian Creek Rocky Boy Soap Bogus Divide Spur Park Tepee Creek West Rosebud FEBRUARY 1, 1971	7100 5200 6450 6100 8760 7000 4700 7600 8000 8000 7500	12/31 12/23 1/06 1/04 1/06 12/31 1/06 12/23 1/06	24 46 33 9 39 37 43	7.0 3.5 4.3 5.8 13.4 9.0 1.9 11.2 8.9 13.6 5.4	7.0 2.6 8.5 2.6 2.1 5.5	600 600 600 600 600 600 600 600
Badger Pass Banfield Mountain Bear Faw Ski Area Blue Lake Bristow Creek Carrot Basin Cedar Grove Davis Creek Garver Creek Hawkins Lake Holbrook King Creek Saddle King Springs Lemhi Pass Lost Soul Mission Mountain Poorman Creek Rocky Boy Spotted Bear Mountain Irail Creek Twin Creeks West Rosebud	5050	2/01 1/21 1/18 1/18 1/18 2/06 1/28 1/28 1/28 1/20 1/28 1/21 2/03 2/06 1/28 2/06	100 40 75 42 81 40 20 19 30 47 21 69 25 51 25	24.0A 12.4 38.3 12.0 23.4 11.1 26.6 10.5A 4.5 3.8 8.3 14.9 4.4 24.2 5.8 15.5A	- 6.4 12.5A 	7.4



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DRAINAGE BASIN and/or SNOW COURSE NAME Elevation THIS YEAR

Snow Depth (Inches)

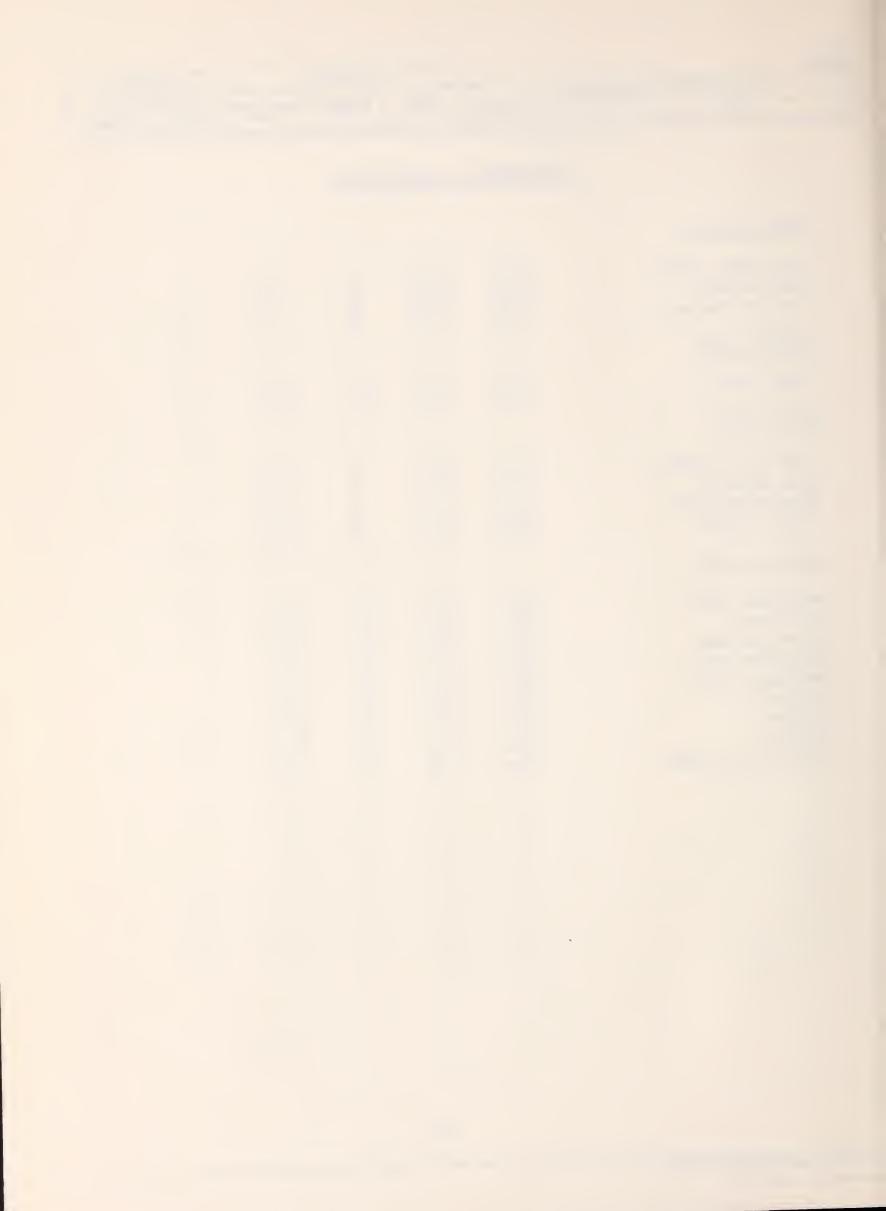
PAST RECORD Water Content (Inches)

Water Content (inches) Last Year Average

# SUPPLEMENTAL MEASUREMENTS

Date of Survey

MARCH 1, 1971						
King Creek Saddle King Springs Mission Mountain	4550 4150 5050	3/02 3/02 3/02	27 24 30	6.4 5.7 7.4	36 80 80	£ 0
APRIL 1, 1971						
Copper Camp	6950	4/01	118	49.4	æ	æ
MAY 1, 1971						
King Creek Saddle King Springs Mission Mountain Taylor Peaks	4550 4150 5050 8500	5/03 5/03 5/03 4/16	0 0 0 78	0.0 0.0 0.0 29.6	36 35 53 53	GEO GEO GEO
MAY 15, 1971						
Abundance Lake Call Road Clover Meadow Dad Creek Lake Darkhorse Lake Divide	8800 8050 8600 8400 8600 7900	5/19 5/19 5/19 5/19 5/19 5/19	68 33 59 53 83 24	28.2 12.6 24.1 21.1 35.3 10.3	60 60 60 50 60	600 000 000 500 500 500 600
Foolhen Notch White Pine Ridge	8280 8500 8850	5/19 5/19 5/19	49 59 0	20.5 22.3 0.0	36 30	



## CORRECTIONS TO PREVIOUSLY PUBLISHED 1971 DATA

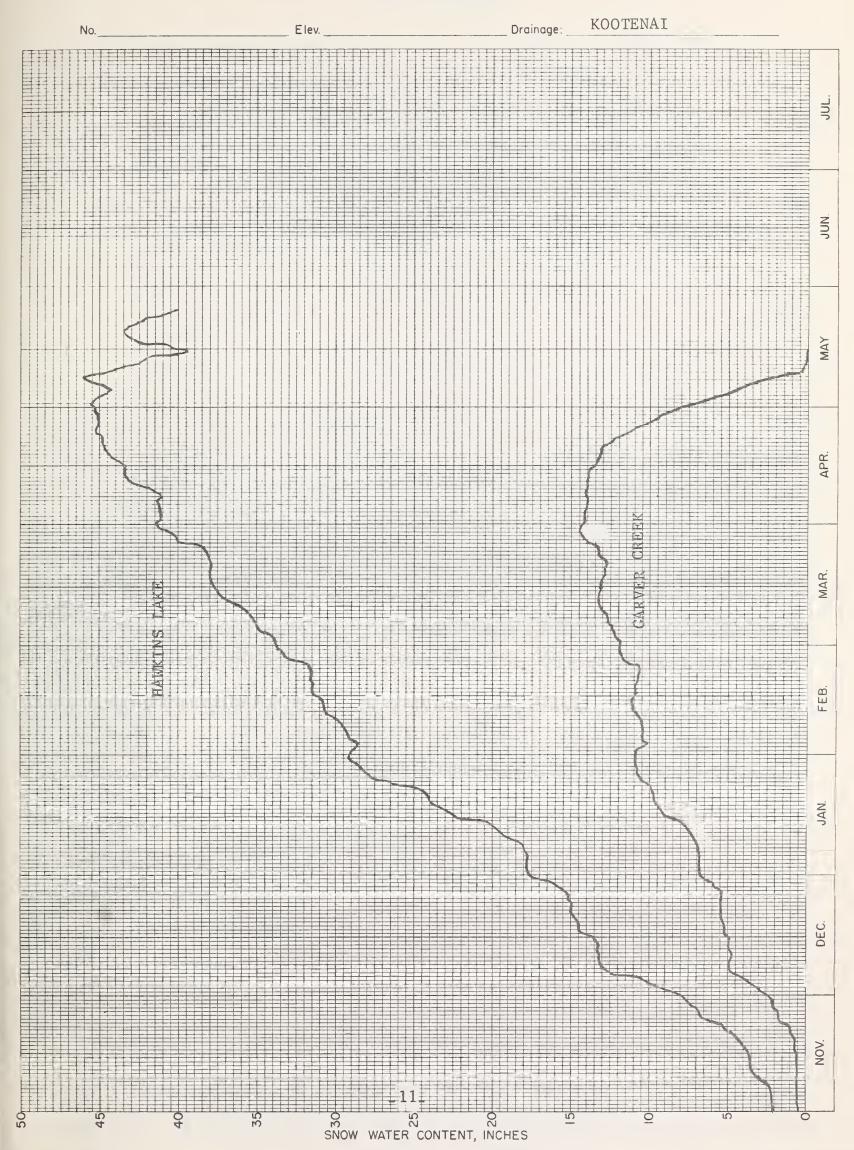
FEBRUARY 1, 1971						
New World Northeast Entrance	6700 7400	1/27 2/02	30 29	8.8 8.9	10.2 8.4	6.4 6.0
MARCH 1, 1971						
Holbrook Stemple Pass Ten Mile Middle Ten Mile Upper West Yellowstone	4530 6600 6800 8000 6700	2/28 3/03 3/01 3/02 2/27	36 43 43 50 53	11.9 12.0 11.5 15.8 15.7	8.8 5.9 6.4 9.2 9.3	11.5
APRIL 1, 1971						
Baree Creek Hawkins Lake Mission Mountain Mount Lockhart Smuggler Mine Spotted Bear Mountain Stemple Pass MAY 1, 1971	5500 6450 5050 6400 6960 7000 6600	4/01 3/31 4/04 4/06 3/29 4/04 3/30	140 107 31 83 42 56 43	57.5 42.6 8.7 33.4 13.2 20.2 12.8	23.4	
Grizzly Peak Lakeview Ridge Mill Creek Northeast Entrance Stuart Mountain Twenty-One Mile West Yellowstone	8400 7400 7500 7400 7400 7150 6700	5/03 4/30 5/03 5/06 4/30 5/01 5/01	89 48 44 20 99 59	29.3 17.0 17.1 9.1 45.4 26.4 14.8	22.4	22.0 9.0 7.1 32.6 16.0 6.2
MAY 15, 1971						
Copper Mountain Hell Roaring Divide Stuart Mountain	7700 577 <b>0</b> 7400	5/14 5/17 5/14	15 42 74	5.0 20.9 35.6	12.0 28.2 38.0	27.5 27.5



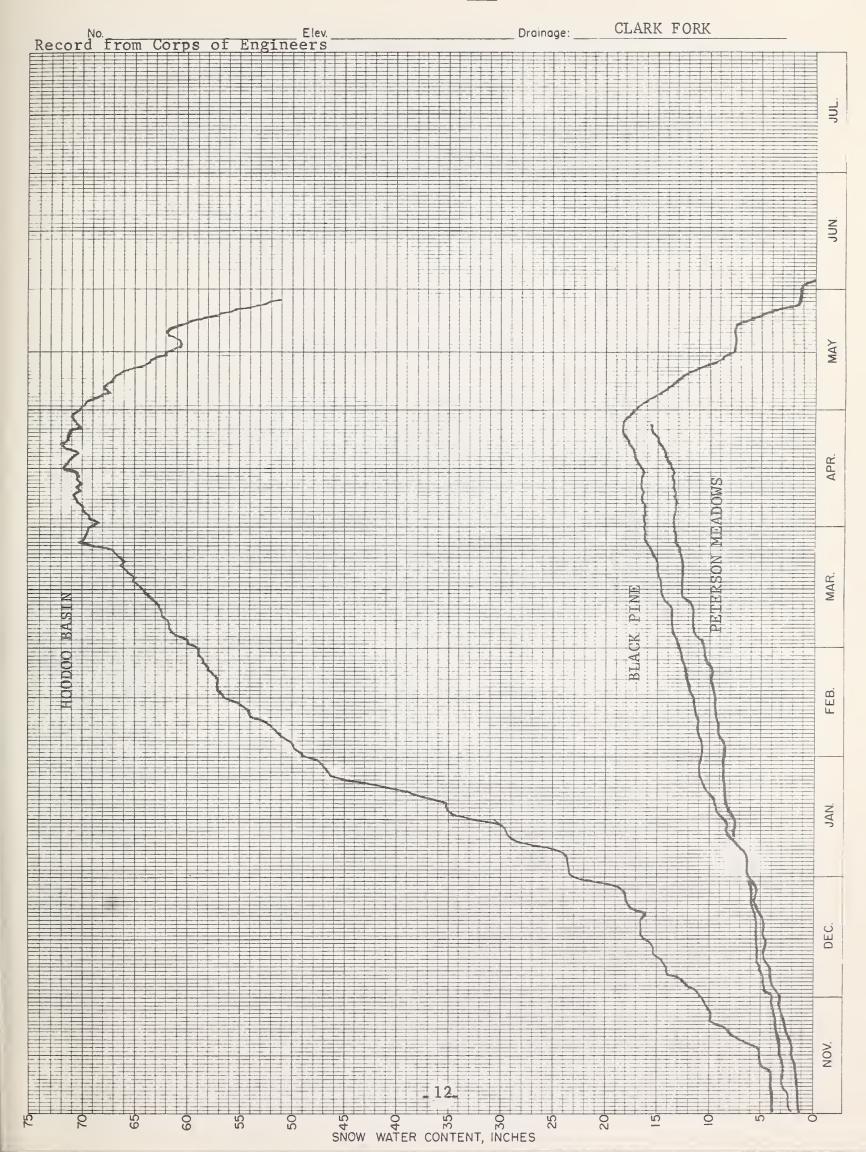
KOOTENAI Drainage: No. Elev. SNOW WATER CONTENT, INCHES



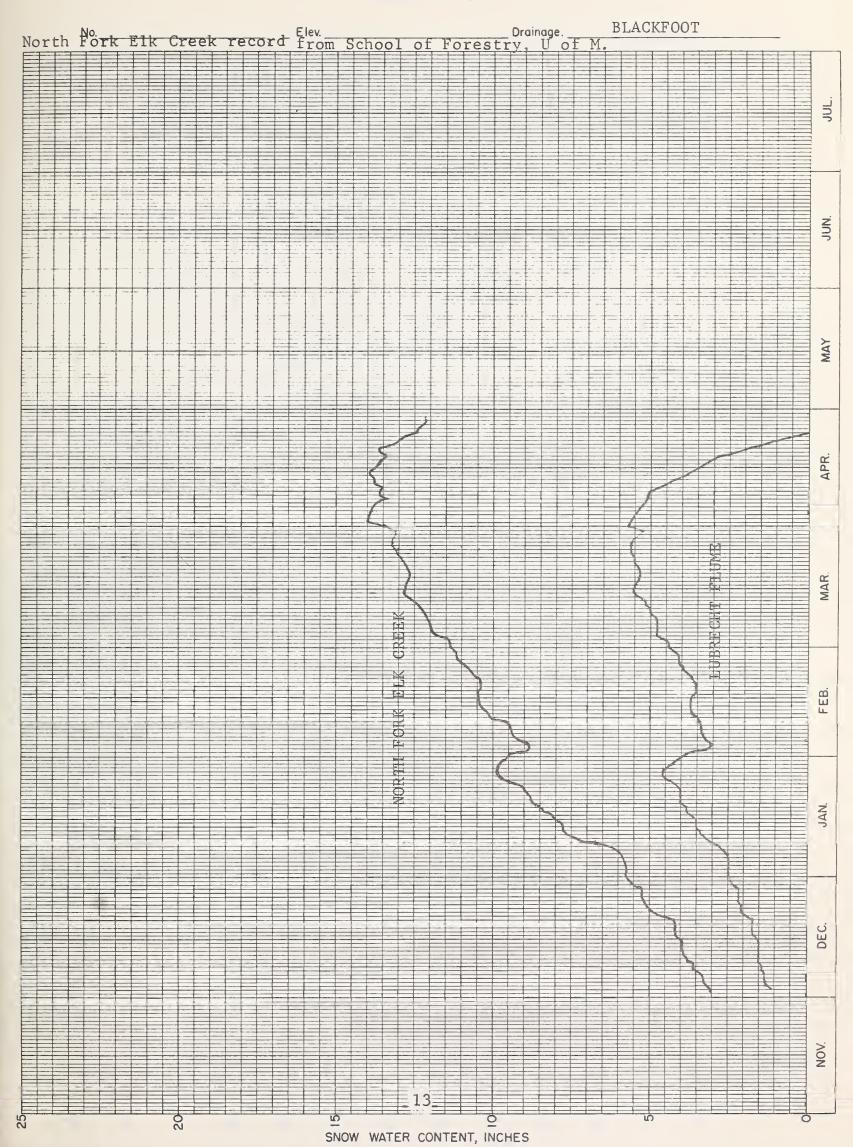
# SNOW PILLOW DATA WATER YEAR 1971







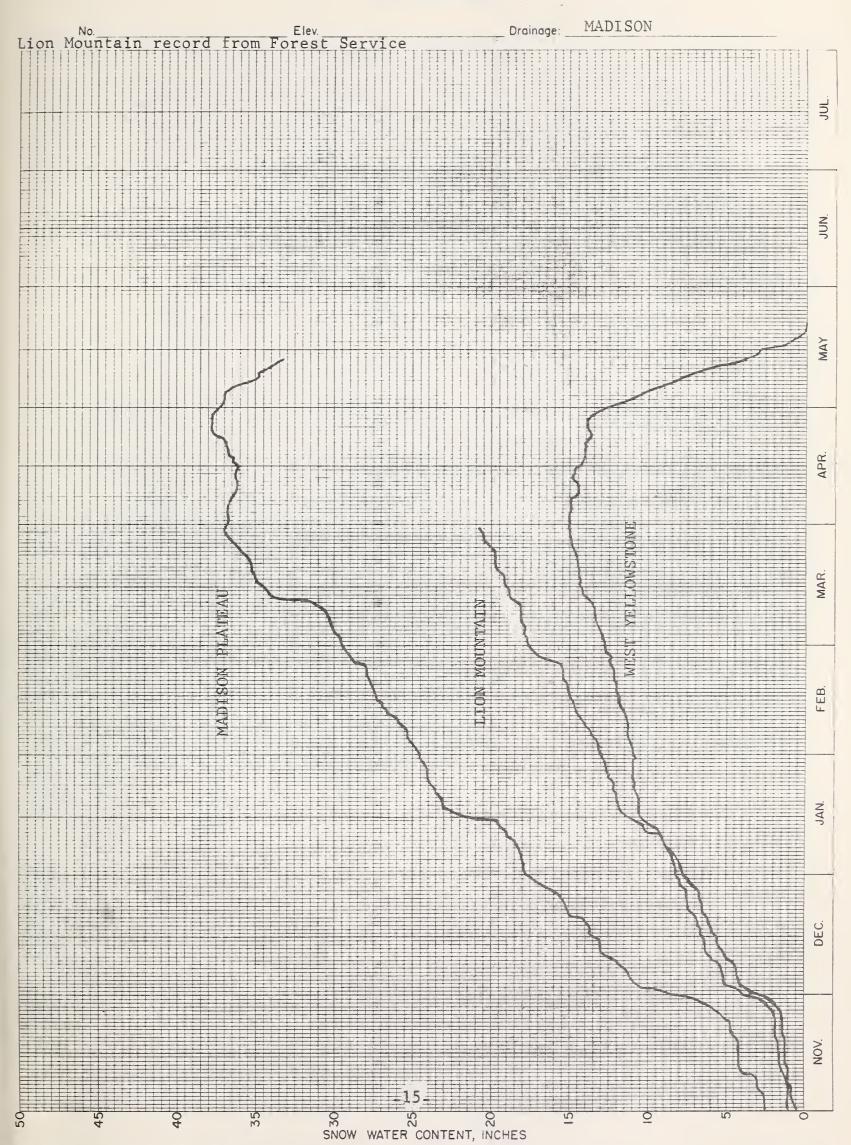




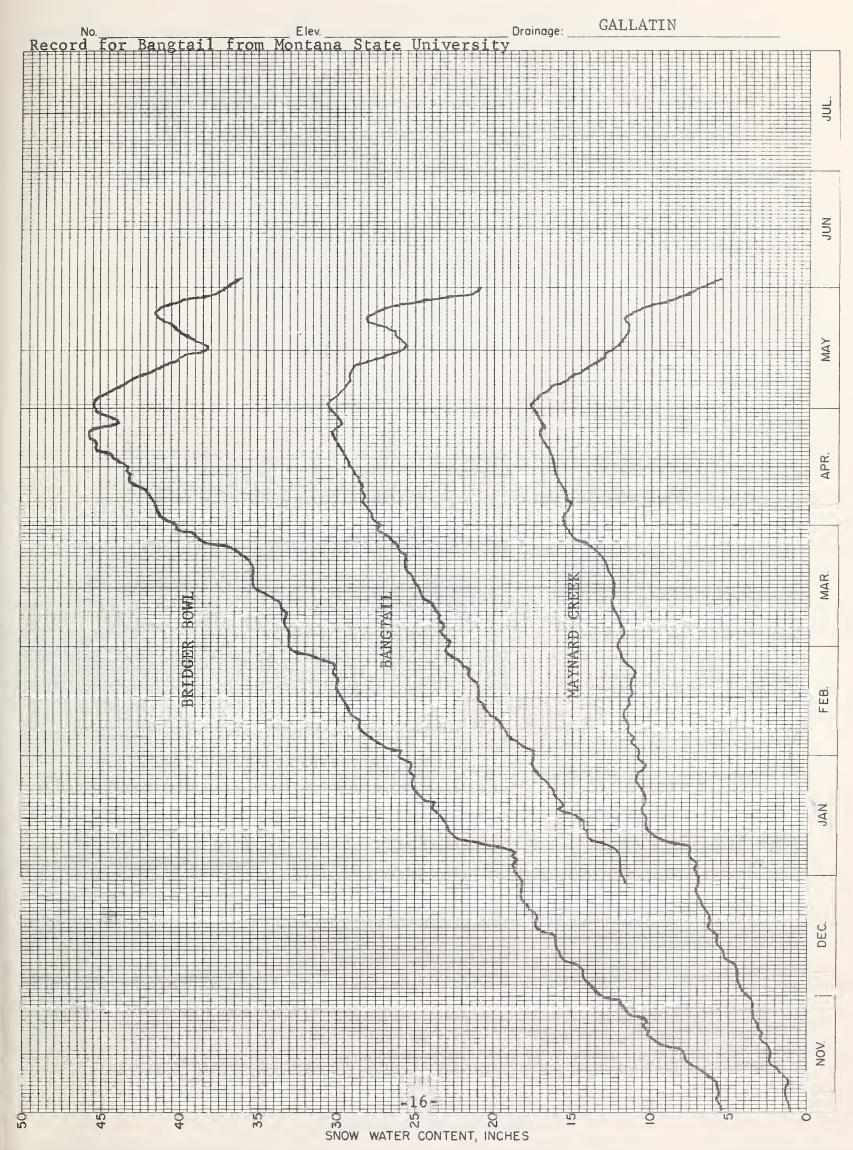


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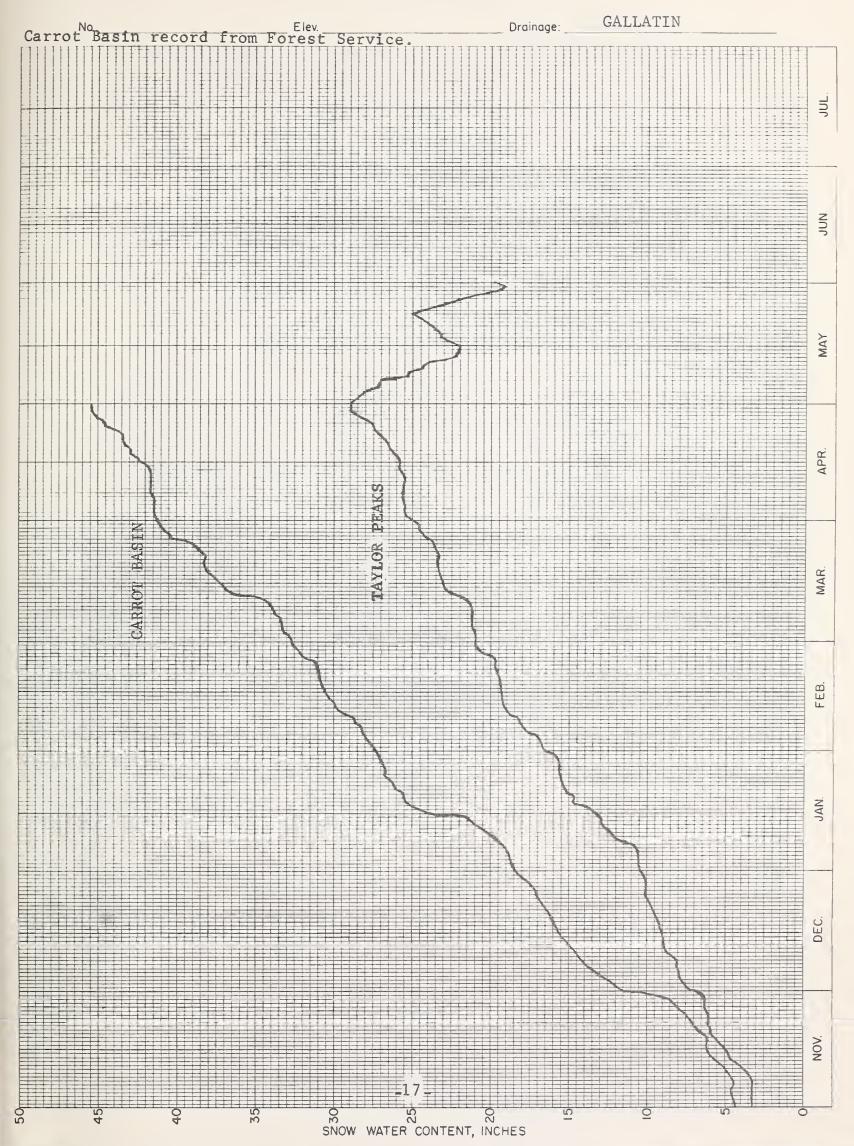




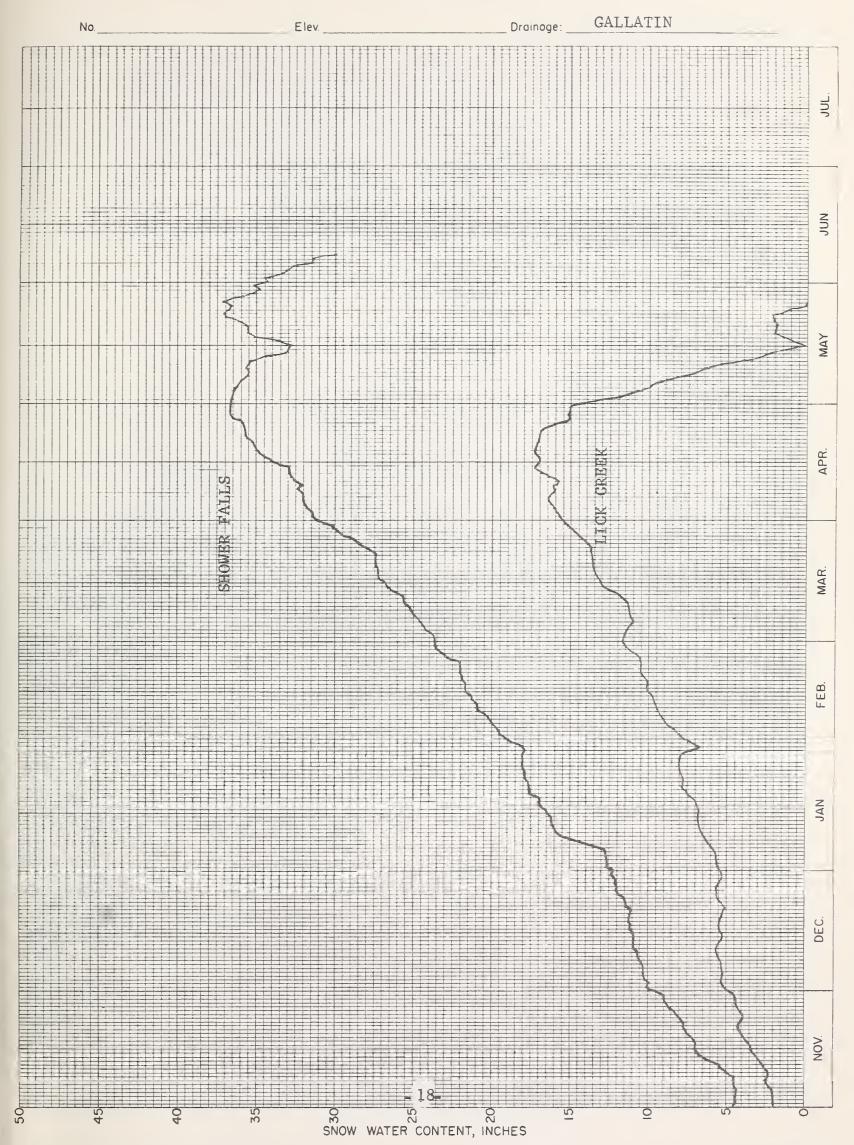




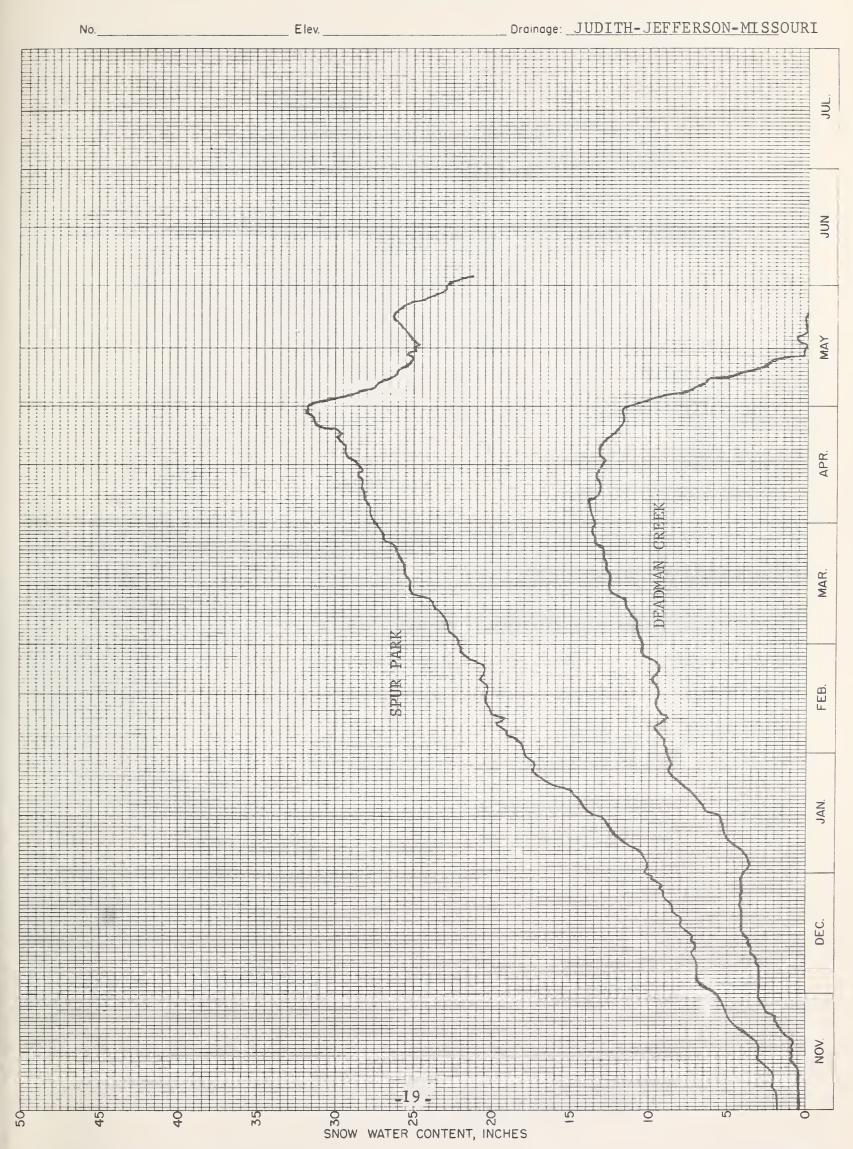




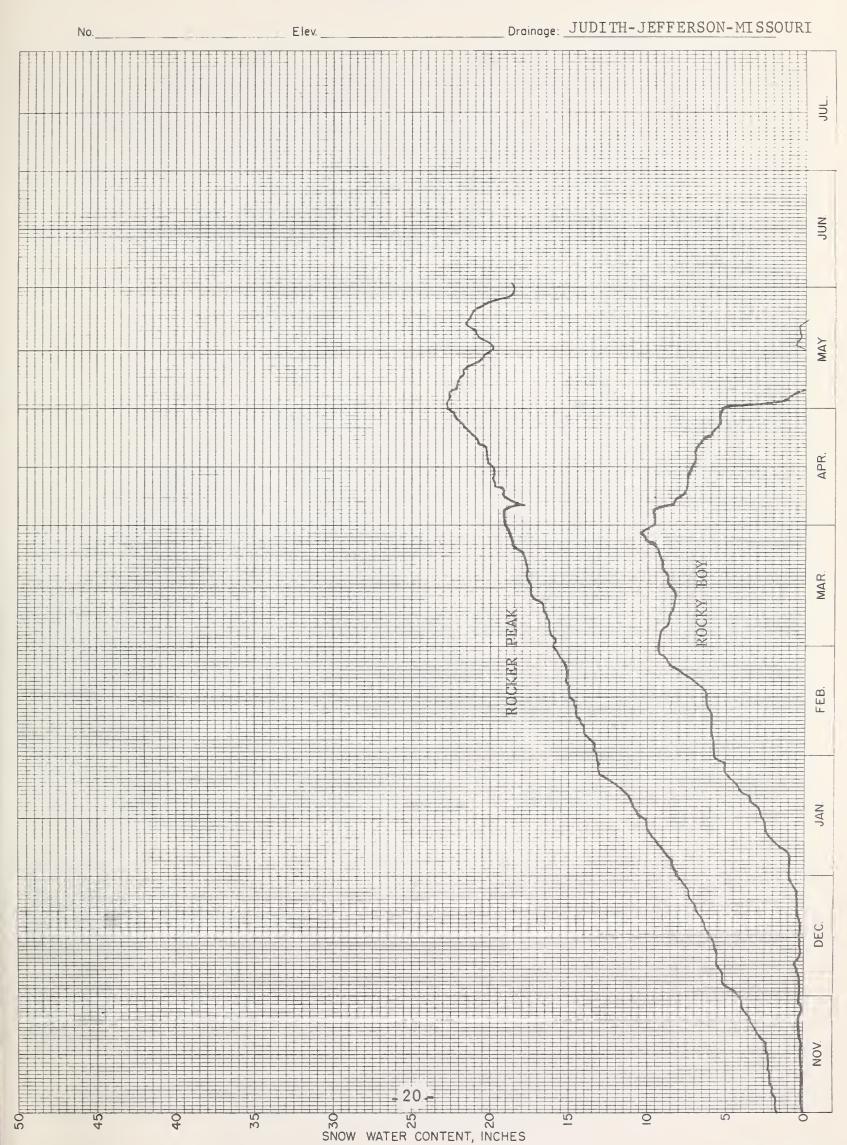






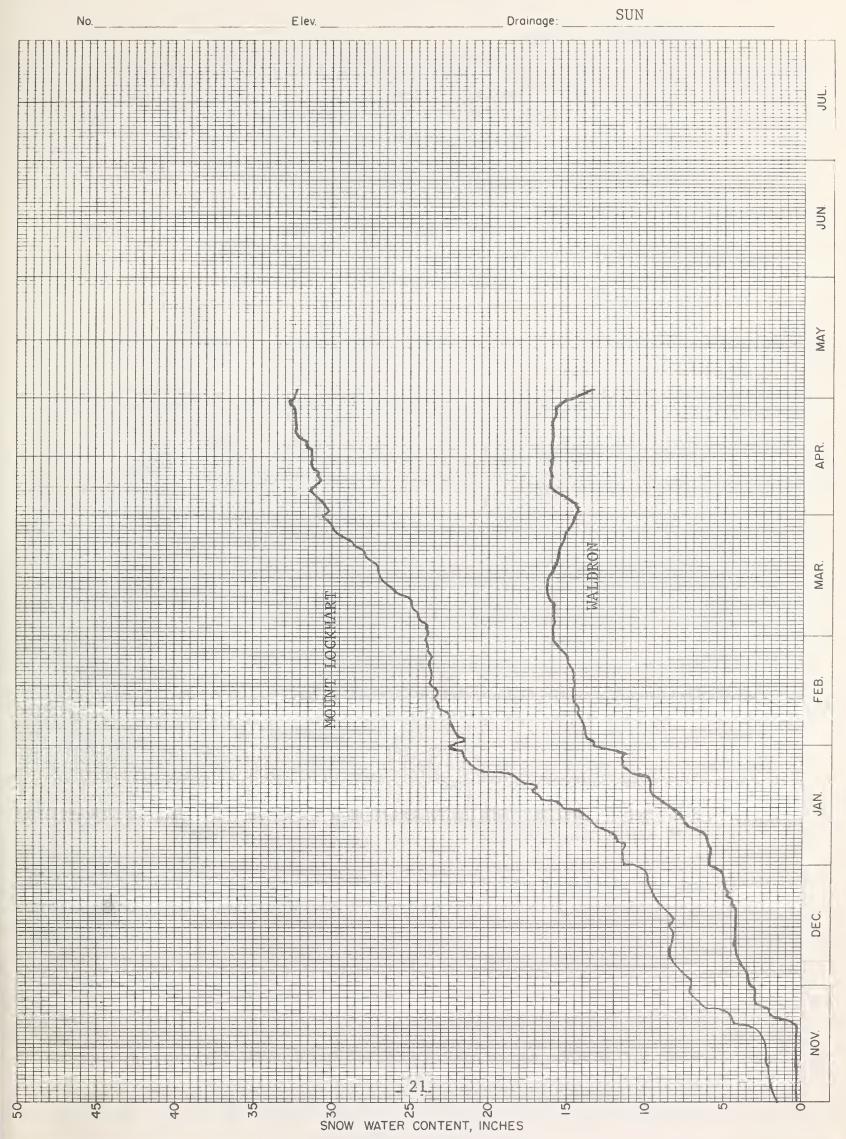






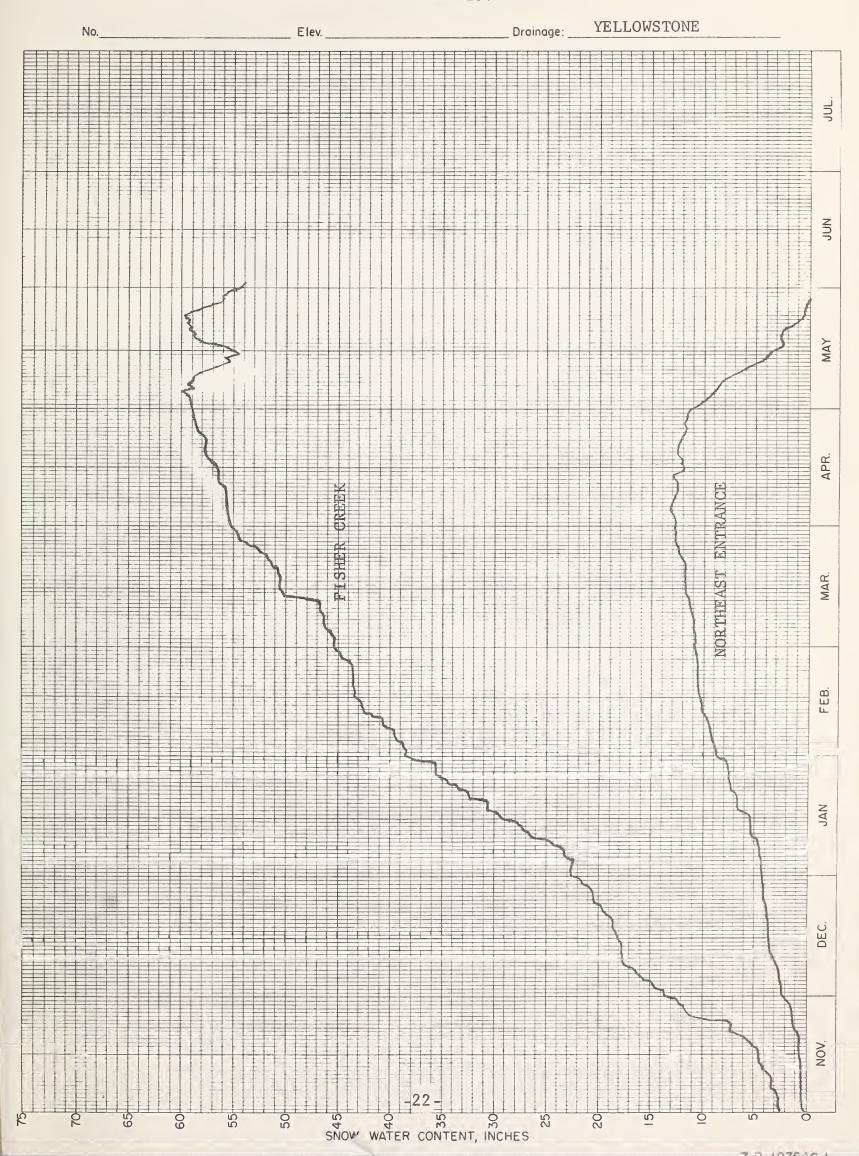


# SNOW PILLOW DATA WATER YEAR 1971

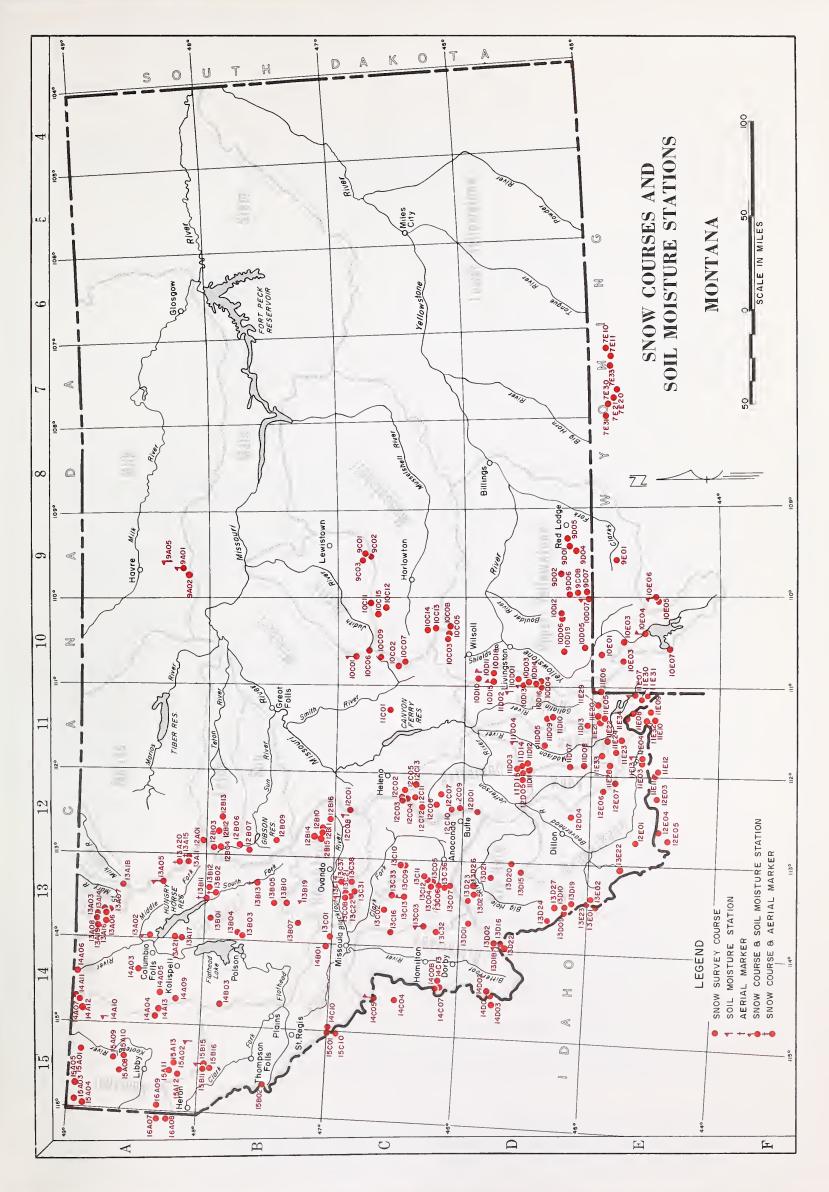




## SNOW PILLOW DATA WATER YEAR 1971







# INDEX to MONTANA SNOW COURSES and SOIL MOISTURE STATIONS

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# Agencies and Organizations Cooperating in Montana Snow Surveys

- U. S. Forest Service
  Region I, Missoula, Montana
  Montana Forests and Ranger
  Districts
- U. S. Geological Survey Helena, Montana Portland, Oregon
- U. S. Army Corps of Engineers Portland, Oregon Seattle, Washington Walla Walla, Washington Omaha, Nebraska
- U. S. Indian Irrigation Service St. Ignatius, Montana
- U. S. Weather Bureau Helena, Montana Portland, Oregon Kansas City, Missouri
- U. S. Bureau of Sports Fisheries and Wildlife Red Rock Lakes Refuge Monida, Montana
- U. S. Bureau of Reclamation Billings, Montana Boise, Idaho
- U. S. Bonneville Power Administration Portland, Oregon

- U. S. Soil Conservation Service Montana, Wyoming, Idaho
- Soil and Water Conservation Districts Montana Counties
- U. S. National Park Service Yellowstone National Park Glacier National Park
- Montana Power Company Butte, Montana
- Montana Water Resources Board Helena, Montana
- North Montana Branch Station Agricultural Experiment Station Havre, Montana
- Montana State University
  Agricultural Experiment Station
  Bozeman, Montana
- University of Montana School of Forestry Missoula, Montana
- Water Rights Branch, Dept. of Lands and Forests Victoria, British Columbia
- Department of Energy, Mines and Resources Calgary, Alberta

UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE P.O. BOX 98

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